

# United States Patent [19]

Shiokawa et al.

[11] Patent Number: 4,849,432

[45] Date of Patent: Jul. 18, 1989

## [54] HETEROCYCLIC COMPOUNDS

[75] Inventors: Kozo Shiokawa, Kanagawa; Shinichi Tsuboi, Tokyo; Shinzo Kagabu, Gifu; Shoko Sasaki, Tokyo; Koichi Moriya, Tokyo; Yumi Hattori, Tokyo, all of Japan

[73] Assignee: Nihon Tokushu Noyaku Seizo K.K., Tokyo, Japan

[21] Appl. No.: 17,641

[22] Filed: Feb. 24, 1987

## [30] Foreign Application Priority Data

Mar. 7, 1986 [JP] Japan ..... 61-48629

[51] Int. Cl.<sup>4</sup> ..... A61K 31/44; C07D 417/06; C07D 401/06

[52] U.S. Cl. .... 514/341; 514/333; 514/340; 514/342; 544/55; 544/96; 544/238; 544/242; 544/333; 544/334; 544/336; 544/409; 546/256; 546/275; 546/278; 546/280; 546/281; 548/127; 548/131; 548/134; 548/136; 548/143; 548/146; 548/193; 548/214

[58] Field of Search ..... 546/278, 280, 256, 275, 546/281; 514/340-341, 342

## [56] References Cited

### U.S. PATENT DOCUMENTS

4,247,705 1/1981 Cale, Jr. .... 546/278  
4,616,025 10/1986 Ezer et al. .... 546/280

### FOREIGN PATENT DOCUMENTS

2205745 8/1973 Fed. Rep. of Germany .  
3409801 9/1984 Fed. Rep. of Germany .  
2126222 3/1984 United Kingdom .

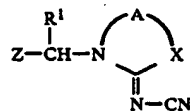
Primary Examiner—Robert T. Bond

Assistant Examiner—James H. Turnipseed

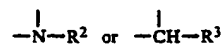
Attorney, Agent, or Firm—Sprung Horn Kramer & Woods

## [57] ABSTRACT

Novel heterocyclic compounds of the formula



wherein, R<sup>1</sup> represents a hydrogen atom or an alkyl group, A represents an ethylene group which may be substituted by alkyl or a trimethylene group which may be substituted by alkyl, X represents an oxygen or sulfur atom or the group



in which R<sup>2</sup> represents a hydrogen atom of an optionally substituted alkyl, an alkenyl, an alkynyl or an acyl group, and R<sup>3</sup> represents a hydrogen atom or an alkyl group, and Z represents an optionally substituted 5- or 6-membered heterocyclic group which contains at least two hetero atoms selected from oxygen, sulfur and nitrogen atoms, or an optionally substituted 3- or 4-pyridyl group.

The above defined novel heterocyclic compounds of formula (I) exhibit powerful insecticidal properties.

9 Claims, No Drawings

204020 " 06T 2300T